

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the affected environment in the vicinity of the Proposed Action (the project area) as it exists today. This description is organized by resource with descriptive information taken from a wide range of sources including the BLM and various other federal and state agencies and has been guided by management issues identified by BLM's RFO, public scoping, and by interdisciplinary field analyses of the project area. The critical elements of the human environment and any potential affects arising from implementation of the Proposed Action are listed in Table 3.1.

Table 3.1

**Critical Elements of the Human Environment, Scotty Lake CBNG
Pilot Project, Sweetwater County, Wyoming¹**

Element	Status in Project Area	Addressed In EA
Air Quality	Potentially Affected	Yes
Areas of Critical Environmental Concern	None Present	No
Cultural Resources	Potentially Affected	Yes
Environmental Justice Concerns	Not Affected	Yes
Prime or Unique Farmlands	Not Affected	No
Floodplains	Not Affected	No
Native American Religious Concerns	Not Affected	No
Threatened and Endangered Species	Not Affected	Yes
Hazardous or Solid Wastes	Not Affected	No
Water Quality	Potentially Affected	Yes
Wetlands/Riparian Habitat	Not Affected	No
Wild and Scenic Rivers	Not Affected	No
Wilderness Concerns	Not Affected	No

¹ As listed in BLM's National Environmental Policy Act Handbook H-1790-1 (BLM 1988) and Subsequent Executive Orders

In addition to the critical elements listed above, this EA also discusses the potential effects of the Proposed Action on geology/minerals, range resources, soils, visual resources, wildlife (including special status species), and wild horses.

3.1.1 Environmental Elements Not Considered in Detail

The following resources would not be adversely affected by implementation of the Proposed Action. Consequently, these resources will not be addressed in this chapter or in Chapter 4.0 (*Environmental Consequences*) to follow.

- ∉ Recreation - the project area consists entirely of federal lands in the northeastern corner of Sweetwater County. Access to this relatively remote area is provided by a series of existing BLM roads which traverse the area and provide access thereto from communities such as Jeffrey City and Wamsutter. Considering that there are no special recreation management areas or developed recreational sites within the project area, combined with the generally large expanse of adjacent federal lands, implementation of the proposed SLPP would not adversely affect recreational opportunities or patterns in the area.
- ∉ Vegetation - considering that there are no T/E, candidate, or sensitive plant species known to occur within the SLPA, the long-term disturbance of 42.11 acres (1.46% of the total surface acreage) over the LOP would not represent an impact to T/E, candidate, or sensitive plant communities within the SLPA. Vegetation and the impacts thereto are considered in other elements within the document including Range Resources and Soils.
- ∉ Environmental Justice - neither the Proposed Action nor the No Action Alternative would disproportionately affect minority or low income people, and is not discussed further in this EA. The proposed project would provide some additional employment opportunities for a small number of workers in Sweetwater County, Wyoming and would add to the local economy.

3.2 GENERAL SETTING AND CLIMATE

The project area is generally situated on the extreme northeastern periphery of the Great Divide Basin, a closed intermountain basin which is located within both the Middle Rocky Mountain Division of the Northern Rocky Mountain Physiographic Province and the Great Plains Division of the Great Plains Physiographic Province (Peterson *et al* 1987, Curtis and Grimes 2004). More specifically, the SLPA is situated in an upland area of northeastern Sweetwater County locally known as Cyclone Rim that is located generally north of Red Creek, south of West Alkali Creek, west of the Stratton Lakes, east/southeast of Scotty Lake, and north/northeast of Bastard Butte. This area is classified as a High Plains Steppe (cold desert) and is characterized by gently to moderately undulated uplands dissected by numerous, ephemeral tributary drainages of Red Creek to the south and West Alkali Creek to the north. Elevations in the project area generally range from a low of 6,960 feet along an ephemeral drainage at a point located in the SW¹/₄SW¹/₄SE¹/₄ of Section 26 in Township 26 North, Range 97 West (Phase III) to a high of 7,280 feet at a point located in the SE¹/₄NE¹/₄SW¹/₄ of Section 17 in Township 26 North, Range 96 West (Phase II).

The local climate is characterized by a lack of moisture (where evaporation exceeds precipitation), which leads to warm summer days, cool summer nights and cold winters characteristic of a continental arid, cold-temperate-boreal climate (Trewartha 1968). Generally speaking, Wyoming has a relatively cool climate with an annual average temperature of 45.6° F, with temperatures above 6,000 feet rarely exceeding 100° F. The average number of frost-free days in northeastern Sweetwater County ranges from 81 to 100 days (Curtis and Grimes 2004). Air masses enter the region from the Pacific and mountains to the west act as effective moisture barriers. The majority of the precipitation occurs as a result of late spring and summer thunderstorms, which coincide with the growing season. The remainder of the precipitation comes in the form of snowfall, primarily from November through April, with heaviest snowfall in the spring (Martner 1986). Annual precipitation at Jeffrey City, Wyoming (closest NOAA weather station) averaged 7.50 inches in 2002 and 10.64

inches in 2003, with peak average precipitation occurring in the months of May and June (NCDC 2002, 2003). Most precipitation occurs as rain due to frontal systems and thunderstorms. Complete precipitation data for the NOAA weather station in Wamsutter, Wyoming was not available for the 2002 or 2003 reporting periods.

Monthly mean temperatures in Jeffrey City during 2003 ranged from a February low of 20°F to a monthly mean high of 71°F in July, with average daily low and high temperatures ranging from 8°F to 31°F in February, and 51°F to 90°F in July (NCDC 2003). However, as is characteristic of dry continental climates, temperature extremes are pronounced with a low temperature of -24°F recorded on February 24, 2003 and a high temperature of 97°F recorded on July 25, 2003. The average number of days per year with a maximum temperature below 32°F is 66 days and the average number of days per year with a maximum temperature above 90°F is 28 days (NCDC 2003).

Mean annual evaporation ranges from 45 inches (lake) to 70 inches (pan); therefore the potential evaporation is 21 to 23 inches, compared to the mean annual precipitation of 6 to 10 inches (Martner 1986, Curtis and Grimes 2004). This gives an average annual deficit of nearly 14 inches, creating a predominantly dry climate where evaporation exceeds precipitation.

Prevailing winds are from the west and southwest. These winds are relatively constant and have an average speed of 12 to 14 miles per hour. The uniformly high wind speeds enhance dispersion, prompting lower pollutant concentrations than would occur in the absence of steady, high wind speeds. Strong, sustained winds occur quite often, and observations indicate winds of 70 to 80 mph (with gusts to 100 mph) can occur throughout Wyoming.

3.3 AIR QUALITY

Current and complete monitoring data for ambient air quality are not available for the SLPA; however, based on data collected in similar locations and reviewed by the State of Wyoming, Department of Environmental Quality, Air Quality Division (WDEQ/AQD), air quality levels are assumed to be in attainment for all Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS).

Estimation of background air pollutant concentrations (reported in micrograms per cubic meter, or $\mu\text{g}/\text{m}^3$) is necessary in order to compare potential total air quality impacts from the Proposed Action and Alternatives with applicable air quality standards. Thus, for comparison against an applicable standard, total impacts are the sum of the background concentration plus direct modeled impacts. It is important that individual background concentration values, model predictions, and applicable air quality standards are for the same averaging time period for each pollutant. Background air pollutant concentration data were provided by WDEQ/AQD (WDEQ 2003b). Background concentrations of carbon monoxide (CO) are taken from representative data collected by WDEQ/AQD and commercial operators at Ryckman Creek for an 8-month period and summarized in the Riley Ridge EIS (BLM 1983). Sulfur dioxide (SO₂) gaseous air pollutant data were gathered at the Lost Cabin Gas Plant site in Fremont County (1986-87). Nitrogen dioxide (NO₂) and ozone data were collected at the Thunder Basin National Grasslands (2001-2002).

Particulate matter less than 10 microns in diameter (PM₁₀) and particulate matter less than 2.5 microns in diameter (PM_{2.5}) were collected in an urban area at the Cheyenne State Office Building (2002). Background air pollutant concentrations and applicable air quality standards are summarized in Table 3.2, which illustrates that regional background concentrations are well below established standards (WDEQ 2003b). These regional monitoring results indicate that air quality within the SLPA exceeds all applicable state and federal air quality standards.

Table 3.2
Background Air Quality Concentrations, Ambient Standards
and PSD Increments (µg/m³)

Airborne Pollutant	Averaging Time ¹	Background Concentration	Air Quality Standards		PSD Increments	
			WAAQS	NAAQS	Class I	Class II
Carbon Monoxide (CO)	1-hour	3,336	40,000	40,000	None	None
	8-hour	1,381	10,000	10,000	None	None
Nitrogen Dioxide (NO ₂)	Annual	5.0	100	100	2.5	25
Ozone (O ₃)	1 -hour	162	235	235	None	None
	8 -hour	150	157	157	None	None
Sulfur Dioxide (SO ₂)	3-hour	93	1,300	1,300	25.0	512
	24-hour	32	260	365	5.0	91
	Annual	4	60	80	2.0	20
PM ₁₀	24-hour	47	150	150	8.0	30
	Annual	16	50	50	4.0	17
PM _{2.5}	24-hour	15	65	65	None	None
	Annual	5	15	15	None	None

Source: WDEQ 2003b.

- 1 Short-term concentrations reflect the maximum measured values during the entire period of record, except for ozone, which reflect the average of available 2001 and 2002 second high data (1-hour) and fourth-high data (8-hour). Short-term (1-hour, 3-hour, etc.) ambient standards allow not more than one expected exceedance per year. Long-term (annual) standards are not to be exceeded.

3.4 CULTURAL RESOURCES

Approximately 330 acres have been inventoried for cultural resources within the SLPA (Albanese 2004), which represents 11.5% of the overall land area included within the project area. An additional 247 acres that lie directly adjacent to the proposed project area have also been inventoried for cultural resources (Albanese 2004). These inventories were conducted in compliance with Section 106 of the *National Historic Preservation Act* (NHPA).

Cultural resource inventories have identified 2 cultural sites within the project area, one of which is considered as eligible for nomination to the *National Register of Historic Places* (NRHP). Based on an overview of the known cultural resource data and geomorphological data for the SLPA, it can be said that there is a moderate potential for locating intact buried cultural deposits. Most significant cultural resources are found along major ephemeral drainages and along the lower benches of escarpments found commonly throughout the project area. Certain topographic settings have higher archaeological sensitivity such as aeolian deposits (e.g., sand dunes, sand shadows, and sand sheets), alluvial deposits along major drainages, and colluvial deposits along lower slopes of ridges.

3.5 GEOLOGY AND MINERALS

Geologic units within the SLPA include the Wasatch, Fort Union, Lance, Lewis and Mesaverde Formations. The Wasatch Formation occurs at the surface throughout the SLPA and generally extends to the top of the Fort Union Formation (Fm). The Wasatch Fm occurs at the surface throughout the SLPA and generally extends to the top of the Fort Union Fm. Both the Wasatch and Fort Union Fms were deposited (formed) in the Paleocene epoch of the Tertiary Period (Cenozoic Era), while the Lance, Lewis and Mesaverde Fms were deposited (formed) in the Late Cretaceous Period of the Mesozoic Era. The primary geologic units that are targeted for CBNG exploration within the SLPA are the Scotty Lake coals which are interbedded in the Fort Union Fm at depths generally ranging between 2,000 feet and 5,000 feet.

3.5.1 Geology

The Scotty Lake (SL) coals are unique in that they are a geologically isolated deposit that pinches out to the west, east, and south and are bounded to the north by both the Wind River Thrust Fault and the Continental Fault. Based upon subsurface mapping (see Section 3.5.2), the SL coal appears to be limited to an area 6 miles wide and 9 miles long (or approximately 54 square miles) in northeastern Sweetwater County. The northern boundary of the SL coal is approximately one-half mile south of the Fremont County line which corresponds to the Wind River Thrust Fault. Rocks on the north side of the thrust fault have been uplifted relative to the south side of the fault and the SL coal interval does not exist to the north of the fault (Babb 2004a). The SL coals occur as three mappable sequences within the Fort Union Fm (upper, middle, and lower coals), each consisting of multiple coal beds with individual beds ranging in thickness for 2 to 50 feet. The top of the SL coal in the Picket Lake Unit #2 is at a depth of 2,121 feet, with the base of the coal at a depth of 4,250 feet. Total SL coal thickness in the Picket Lake Unit #4 is 477 feet. Numerous shale sequences in the lower Wasatch Fm occur above the top of the SL coal, thereby providing an impermeable barrier between the top of the SL coal and shallower fresh water aquifers which may occur in the upper portions of the Wasatch Fm. It should be noted that the Osborne Spring Unit #31-24 recently drilled by Cabot Oil and Gas Corporation (SE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 32 in Township 26 North, Range 97 West) reportedly did not encounter the SL coal interval (Hudson 2004).

The Big Red (BR) coal is also present within the SLPA, occurring at depths approximately 3,000 feet below the base of the SL coals. The BR coal is more regional in extent than the SL coals, underlying most of the Great Divide Basin (3,895 mi²), outcropping on the Rock Springs uplift approximately 38 miles southwest of the SLPA and pinching out to the north as it approaches the faulting and thrusting associated with the Wind River mountain range. The BR coal is part of a

regional hydrologic system, with water contained therein subjected to higher pressures, temperatures, and residence times resulting in higher mineralization and lower water quality as compared to the SL coal. This has been demonstrated by recent exploration activity within the BR coal to the west/southwest (Kennedy Oil Lower Bush Creek Project), which recorded total dissolved solids (TDS) of 21,771 parts per million (ppm) from water produced by the Kennedy State #1-36 well located in the NE¼NE¼ of Section 36 in Township 23 North, Range 97 West (BLM 2003a). The presence of numerous shale and siltstone facies between the base of the SL coal and the top of the BR coal effectively isolates these two coal-bearing units (Hudson 2004).

3.5.2 Minerals

In 1978, Davis Oil Company (Davis) formed the Picket Lake Unit (PLU) which encompassed approximately 14,458 acres including the acreage now proposed for CBNG exploration within the SLPA. The PLU was primarily formed to test the productive potential of the Mesaverde Fm at depths of up to 14,000 feet. Subsequent to the approval of the PLU by the U.S. Geological Survey (USGS) on July 25, 1978, Davis proceeded to drilled five wells in the newly-formed exploratory unit between July 27, 1978 and October 19, 1979 (see Table 3.3). Of these five initial unit wells, four were completed in the Lewis formation as producing gas wells and one well was drilled and subsequently abandoned. Davis also drilled a sixth well directly adjacent to the PLU named the Zephyr Federal #1. Presidio Exploration, Inc. subsequently drilled a seventh unit well in 1995, which was also completed in the Lewis formation as a producing gas well. Of the five unit wells successfully completed in the Lewis Fm, two were subsequently plugged and abandoned as non-commercial wells in the mid 1980's. The two remaining wells continue to produce from the Lewis Fm and are currently owned and operated by Hudson Group, LLC. Geologic information obtained from the drilling of these wells, coupled with regional geologic data gathered from other conventional oil/gas wells drilled in the northern end of the Great Divide Basin, have been compiled by Hudson Group, LLC and were subsequently utilized to identify a general CBNG project proposal.

In this regard, it should be noted that the concept of CBNG production from the Scotty Lake coals has been tested on a very limited basis through the re-entry of the PLU #1, PLU #2 and PLU #4 abandoned well bores by the operator in 2002. These existing well bores were re-entered and completion operations undertaken in selected intervals within the Scotty Lake coals. Preliminary gas/water production information obtained from these three re-entries has resulted in the current pilot project proposal to further define the nature of the Scotty Lake coals and the potential for commercial CBNG production therefrom.

Of the eight wells that have been drilled in the overall project area since the formation of the PLU, total reclamation has been achieved on those wells which have subsequently been plugged and abandoned except as noted below. It should be noted that the WOGCC has no record for any wells drilled in the SLPA prior to the approval of the Picket Lake Unit by the USGS in 1978. Likewise, the non-working areas of the 2 producing Lewis wells have also been successfully reclaimed. Re-entry and re-completion operations on the PLU #1, PLU #2 and PLU #4 resulted in additional short-term surface disturbance on these previously abandoned and reclaimed locations.

Table 3.3

Wells Previously Drilled in and/or Adjacent to the SLPA

Well Name and Number	Legal Location of Well				Target/Producing	Spud Date	Well Status
	Quarter	Section	Township	Range	Formation		
Zephyr Federal #1	NW¼SW¼	17	26 North	96 West	Mesaverde	07/28/1979	P & A
Picket Lake Unit #3 ¹	NW¼SW¼	18	26 North	96 West	Lewis	02/28/1979	Producing
Picket Lake Unit #2 ²	SW¼NW¼	19	26 North	96 West	Lewis	05/25/1979	P & A
Picket Lake Unit #5	SW¼NE¼	13	26 North	97 West	Lewis	08/04/1979	P & A
Picket Lake Unit #40-13 ¹	C SE¼	13	26 North	97 West	Lewis	04/10/1995	Producing
Picket Lake Unit #4 ²	NW¼SE¼	23	26 North	97 West	Lewis	05/11/1979	P & A
Picket Lake Unit #1 ²	NW¼SE¼	24	26 North	97 West	Lewis	07/27/1978	P & A
Picket Lake Unit #6	SW¼NE¼	25	26 North	97 West	Mesaverde	10/19/1979	D & A

¹ The producing wells referenced above are owned/operated by Hudson Group, LLC

² Abandoned well bores re-entered by Hudson Group, LLC and completed in the Fort Union Formation

Source: Wyoming Oil and Gas Conservation Commission Well Files and Computerized Database (WOGCC 2004)

Based upon field examination, the five active wells within the project area currently represent approximately 13.15 acres of surface disturbance within the overall project area. Considering the overall age of the existing road/pipeline infrastructure within the PLU/SLPA, we will assume that short-term reclamation of non-working areas of these linear ROWs has been achieved and that any remaining long-term surface disturbance within the project area is limited to the existing access road network. Initial construction of the approximately 50,748 feet (9.61 miles) of access road within the project area resulted in total surface disturbance equal to 46.60 acres (assuming a total disturbed ROW width of 40 feet). The subsequent reclamation of approximately 30% of these existing access road ROWs (including cut/fill slopes and outslope areas of the borrow ditch) has resulted in long-term or LOP disturbance equal to approximately 27.96 acres.

3.6 HYDROLOGY

3.6.1 Surface Hydrology

The SLPA encompasses portions of two separate watersheds as follows:

- 1) Red Creek, containing approximately 13,184 acres (20.6 mi²), which makes up 90% of the overall SLPA. For the purposes of this environmental analysis, the Red Creek watershed is defined as those ephemeral tributaries of Red Creek either directly or indirectly affected by surface water discharges as indicated in the Water Management Plan contained in Appendix D (Babb 2004b); and
- 2) West Alkali Creek, containing approximately 37,760 acres (59.0 mi²), which makes up 10% of the overall SLPA.

The hydrologic divide between these two watersheds is Cyclone Rim, which generally represents the jurisdictional boundary between BLM's Lander and Rawlins Field Offices. The West Alkali Creek watershed lies to the north of Cyclone Rim while the Red Creek watershed lies to the south. Hudson Group, LLC is currently discharging water produced from the Picket Lake Unit #2 to an ephemeral tributary of Red Creek at the rate of approximately 550 barrels of water per day (bwpd). Water being produced from the Picket Lake Unit #1 and Picket Lake Unit #4 wells is being contained in water retention pits located directly adjacent to each respective well.

The bulk of the SLPA (2,586 acres) falls within the overall Red Creek watershed, which encompasses approximately 76,160 acres (119 square miles) within the Great Divide Basin and which ultimately flows into Hay Reservoir (Babb 2004b). The West Alkali Creek watershed encompasses approximately 37,760 acres (59 square miles) and merges with East Alkali Creek in Section 24 of Township 28 North, Range 96 West (Babb 2004a). As their names imply, these watersheds are drained by ephemeral tributaries of Red Creek and West Alkali Creek respectively. These ephemeral drainages are intermittent in nature and normally flow only during periods of spring runoff and/or localized periods of heavy rainfall. As indicated above, runoff generated in the Red Creek watershed would flow west/southwest to Hay Reservoir, which has no outlet. Runoff generated in the West Alkali Creek watershed would generally flow to north into the Sweetwater River via Alkali Creek.

Other than the two water retention pits mentioned above, there are no other surface impoundments (stock reservoirs) within the SLPA.

A fairly comprehensive look at surface hydrology within the area is presented in the Scotty Lake CBNG Pilot Project Water Management Plan (WMP) contained in Appendix D.

3.6.2 Sub-Surface Hydrology

The primary, near-surface, fresh water aquifer within the SLPA is the Eocene Wasatch Fm which overlies the Tipton shale member of the Green River Fm (Babb 2004b). In the Picket lake Unit #1, the Wasatch Fm extends from the surface to a depth of approximately 2,681 feet (Babb 2004a). A review of existing ground water rights within the SLPA issued by the Office of the Wyoming State Engineer indicates that two water supply wells have been drilled and completed within the project area as follows:

- ∄ Picket Lake #40-13 Water Well: NE¹/₄SE¹/₄ of Section 13, Township 26 North, Range 97 West. Permit #P145371W issued to Hudson Group, LLC and the Bureau of Land Management, Priority Date 06/03/2002. Well drilled to a total depth of 600 feet, yield 25 gpm.
- ∄ Picket Lake #1 Water Well: NW¹/₄SE¹/₄ of Section 24, Township 26 North, Range 97 West. Permit #P135633 issued to Hudson Group, LLC and the Bureau of Land Management, Priority Date 06/06/2001. Well drilled to a total depth of 500 feet, yield 20 gpm.

Both of the above wells were permitted and drilled by Davis Oil Company in 1978 in conjunction with initial (conventional) oil/gas exploration activities in the Picket Lake Unit and subsequently re-permitted by Hudson Group, LLC for their operations therein.

A fairly comprehensive look at sub-surface hydrology within the area is presented in the Scotty Lake CBNG Pilot Project Water Management Plan (WMP) contained in Appendix D.

3.7 RANGE MANAGEMENT

The 2,880 acres of public land included within the SLPA encompass portions of two separate grazing allotments including Cyclone Rim and Green Mountain Common, which are administered by the Rawlins and Lander Field Offices, respectively. Table 3.4 provides general information concerning each grazing allotment within the SLPA including allotment name and number, managing office, total acres of public land and total Animal Unit Months (AUMs) in each respective allotment.

Table 3.4

Grazing Allotments in the SLPA

Allotment Name	BLM Office	Allotment Number	Acres of Public Land	Total AUM'S
Cyclone Rim	Rawlins	10103	291,954	40,661
Green Mountain Common	Lander	32001	468,379	47,729

Grazing management on the Cyclone Rim Allotment (CRA) was evaluated by the RFO in 2002 and the SLPA area passed all standards for rangeland health and trend. Overall, the CRA passed all standards except Riparian/Wetland Health due primarily to excessive use by wild horses during the growing season, which has been complicated in some cases by livestock grazing. The Standards and Guides Report for the Great Divide Basin (BLM 2003b) states that these areas would likely show heavy use even with proper grazing management and proper management of the wild horse population due to the unique and rare characteristics for these areas and the relatively higher palatability of the associated plants.

Current livestock grazing management for portions of the Green Mountain Common Allotment (GMCA) has been evaluated by the LFO as unsatisfactory. The overall trend in condition is declining on the riparian areas within the GMCA based upon standards assessments which were performed by LFO in July, 1999. These standards assessments found that approximately 15,000 to 25,000 acres (3 to 5 percent) of the public lands primarily near or associated with riparian areas within the GMCA were not in compliance with Wyoming BLM standards for Rangeland Health (BLM 1998). As a result, initial changes in livestock management practices were implemented in 2000 and have been ongoing for the last 4 years. The current grazing management plan is being revised. It is projected that plan implementation will be fully completed within the next 5 years.

Generally speaking, Cyclone Rim represents the unfenced boundary between the Cyclone Rim and the Green Mountain Common Allotments, with the CRA to the south and the GMCA to the north. In the past there has been minimal north/south livestock drift over the rim due to the general lack of developed or natural surface water in the vicinity thereof.

There are no known rangeland improvements within the proposed SLPA that would be affected by surface disturbing activities associated therewith.

A survey of the proposed SLPA was conducted in July 2004 to identify infestations of noxious or invasive non-native weed species within the overall project area. No noxious weeds, as designated by Wyoming Statute (W.S.) 11-5-102(a)(xi) (WSWT 2003), were located within the project area. Two invasive non-native weed species were located on existing disturbed areas within the SLPA and included both halogeton (*Halogeton glomeratus*) and Russian thistle (*Salsola iberica*). An infestation of Russian knapweed (*Acroptilon repens*) was located approximately five miles south of the SLPA, which represents the nearest known noxious weed infestation. Likewise, an infestation of halogeton was identified approximately three road miles south of the SLPA. Both weed infestations were observed along existing BLM Road #3219.

It is possible that Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), and leafy spurge may occur on or adjacent to previously disturbed areas within the overall area. These particular species have been designated as noxious weeds by the State of Wyoming [Wyoming Statute (W.S.) 11-5-102(a)(xi)] (WSWT 2003).

3.8 SOILS

Soils information for northern Sweetwater County is primarily limited to a Fourth Order Soils Inventory which describes soils within the project in very general terms only. Based upon this Fourth Order Inventory, the predominate soil encountered within the SLPA consists of Typic Torriorthents complex. This soil complex consists of ridges and steep hillsides at elevations ranging between 6,600 and 7,400 feet and on slopes of 6 to 40 percent and is composed primarily of shallow Typic Torriorthents occupying rounded ridges and steep hillsides. Included in this complex are areas of rock outcrop which consists of thin, very gravelly soils and steep drainages. The Typic Torriorthents have a loam to gravelly loam profile extending down to soft bedrock at depths of 10 to 20 inches and exhibit moderate permeability, low available water capacity, and are used primarily for range and wildlife habitat.

Soils in the S½NW¼ of Section 26 in Township 26 North, Range 97 West (Phase III) are included within the Typic Torriorthents association, rolling, which occur on gently sloping to sloping alluvial fans and on rolling upland hillsides at elevations ranging from 6,700 to 7,000 feet and on slopes of 3 to 15 percent. The areas consist of approximately 45% deep Typic Torriorthents on alluvial fans and approximately 35% moderately deep Typic Torriorthents on rolling hillsides. Included in these areas are loam or channery loam and sandy loam soils with soft bedrock at 10 to 20 inches. These Typic Torriorthent soils have a loam surface layer 2 to 3 inches thick with loam underlying layers to approximately 40 inches. These soils exhibit moderate permeability and moderate to high available water capacity.

As indicated in Section 3.7, a survey of the proposed SLPA was conducted in July 2004 to review soil types within the SLPA. Based upon this survey, soils over the area fall in the Typic Torriorthents association as described above, but range from sandy loam to clay loam soils that are very shallow to shallow on average for those sites to be disturbed.

3.9 VISUAL RESOURCES

As indicated in Section 1.1, the SLPA encompasses federal lands that are included within both the Lander (LFO) and Rawlins (RFO) Field Offices. Those portions of the project area that fall within the jurisdiction of the LFO have been designated as Visual Resource Management (VRM) Class IV (modification of the landscape character) in the Lander Resource Management Plan Final Environmental Impact Statement (BLM 1986). Under this VRM class, changes may subordinate the original composition and character of the landscape; however, they should reflect what could be a natural occurrence within the characteristic landscape.

Those portions of the project area that fall within the jurisdiction of the RFO have been designated as VRM Class III (partial retention of the landscape character) in the Great Divide Resource Area Record of Decision and Approved Resource Management Plan (BLM 1990). Under this VRM class, changes in the basic elements (form, line, color, or texture) caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing (land) character.

Cultural modifications to the existing landscape within the SLPA have resulted from construction activities primarily associated with previous oil/gas exploration activity within the area as outlined in Table 3.3. Previous road construction activities within the overall project area (BLM roads 3216 and 3219) not associated with oil/gas exploration activity has also resulted in cultural modifications to the existing landscape.

3.10 WILDLIFE AND SPECIAL STATUS SPECIES

The dramatic differences in altitude encountered in Wyoming have resulted in a varied climate which has produced differing floral and faunal communities, referred to by Cary (1917) as life zones. Of the five life zones he described for Wyoming, only the Upper Sonoran can be found in the Great Divide Basin and covers a broad expanse of the relatively low altitude country in the arid Red Desert.

Vegetation typically includes different species of saltbush, greasewood (*Sarcobatus vermiculatus*), different species of rabbitbrush, sagebrush, including spiny sagebrush (*Artemisia spinescens*), Plains yucca (*Yucca glauca*), and different species of prickly pear cactus, with skunk bush (*Schmaltzia trilobata*) and different species of juniper on the bluffs (SCS 1974). Specific vegetation observed within the project area which is characteristic of this life zone and the soils identified therein include greasewood, rabbitbrush, sagebrush, prickly-pear cactus, Indian ricegrass, western wheatgrass, and prairie junegrass.

The Upper Sonoran zone within the SLPA is somewhat weak in nature in that it exhibits a relatively small number of the characteristic life zone species of mammals and birds. Mammalian species which exemplify this zone within the Great Divide Basin, and which would be expected to occur within the specific project area include the Pronghorn antelope (*Antilocapra americana*), Colorado chipmunk (*Eutamias quadrivittatus*), Northern grasshopper mouse (*Onychomys leucogaster articeps*), kangaroo rat (*Dipodomys ordii luteolus*), and spotted skunk (*Spilogale putoris*).

3.10.1 Big Game Species

These big game species occur within the overall project area and include Pronghorn antelope (*Antilocapra americana*), Mule deer (*Odocoileus hemionus*), and Rocky Mountain elk (*Cervus elaphus*) and are discussed in greater detail below.

Pronghorn Antelope

Antelope populations residing within the overall project area are classified within the Red Desert Herd Unit, which includes antelope hunt areas 60, 61, and 64. The herd objective for antelope in the Red Desert Herd Unit is 15,000 post hunt animals (WGFD 2003a). Generally speaking, antelope numbers in the Red Desert Herd Unit are near, but slightly below the desired herd objective, with the 2003 population estimated at 14,950 animals (see Table 3.5). Recruitment (fawn production) in this herd unit has been below management goals for 10 of the last 11 years, with an estimated 48 fawns per 100 does in 2002. Likewise, buck/doe ratios are also below the stated management goal of 60 bucks per 100 does, with an observed buck/doe ratio of 49 bucks per 100 does in 2002. The low buck/doe ratios combined with a population that is nearing objective will result in the issuance of additional doe/fawn licenses and a concomitant decrease in buck licenses in an attempt to achieve a buck/doe ratio of 60 bucks per 100 does, while maintaining the population at or near the stated population objective (WGFD 2003a). There is no crucial antelope winter range within the SLPA.

Mule Deer

Mule deer populations residing in that portion of the project area located on the south side of BLM Road #3216 (Cyclone Ridge Road) are classified within the Steamboat Herd Unit, which comprises deer hunt area 131. Populations of mule deer on the north side of the Cyclone Ridge Road are classified within the South Wind River Herd Unit, which includes deer hunt areas 91-95 and 160. Herd objectives for mule deer in the Steamboat and South Wind River Herd Units are 4,000 and 13,000 post hunt animals, respectively (WGFD 2003a). Herd objectives for mule deer in both herd units are below objective by 22.5% and 43% respectively (WGFD 2003a) due primarily to the effects of the ongoing drought on population recruitment - particularly in those portions of both herd units within the Great Divide Basin as a direct result of water availability (see Table 3.5). The inability of these deer populations to rebound from the sustained drought has resulted in license reductions and a concomitant reduction in hunter opportunity in both herd units (WGFD 2003a). There is no crucial mule deer winter range within the SLPA.

Rocky Mountain Elk

Elk populations residing within the overall project area are classified within the Steamboat Herd Unit, which comprises elk hunt area 100. The herd objective for the Steamboat Herd Unit is currently 1,200 post hunt animals with a 2002 post-hunt population estimate of 1,530 animals (see Table 3.5). It should be noted that the herd unit objective was increased by 240% in 2002 from 500 post-hunt animals to the current herd objective of 1,200 animals (WGFD 2003a). As the numbers imply, elk populations in the Steamboat Herd Unit have expanded well beyond the initial herd unit objective of 500 post hunt animals and are thriving within hunt area 100.

Table 3.5

**Population Objectives, 2002 Post-Hunt Population Estimates and
and Population Trends in Antelope Elk and Mule Deer Populations in the SLPA**

Herd Unit	Elk			Antelope			Mule Deer		
	Objective	Actual	Trend	Objective	Actual	Trend	Objective	Actual	Trend
Red Desert				15,000	14,950	0.33%			
Steamboat	1,200	1,530	127.5%				4,000	3,000	25%
S. Wind River							13,000	7,385	43%

Source: WGFD Annual Big Game Herd Unit Job Completion Reports (JCRs) for the Lander and Green River Regions (WGFD 2003a)

The increased elk population has resulted in increased hunting opportunity as permits for both bull and cow elk have been increased in an effort to decrease the population below 1,600 animals and move towards the current herd objective.

3.10.2 Greater Sage Grouse

The greater sage grouse (*Centrocercus urophasianus*) is an important upland game bird in Wyoming and the project area does contain limited amounts of suitable nesting habitat; however, there are no known leks within a 2 mile radius of the proposed SLPA. The closest known leks to the project area are located as follows:

- ∄ Bastard Butte Lek: NE¹/₄SE¹/₄ of Section 10, T25N, R97W - lek active in 2003;
- ∄ Scotty Lake Lek: SE¹/₄NW¹/₄ of Section 17, T26N, R97W - lek active in 2003;
- ∄ Red Creek Lek: NE¹/₄NE¹/₄ of Section 10, T26N, R98W - lek active in 2003;
- ∄ Red Creek Well Lek: SW¹/₄SW¹/₄ of Section 30, T25N, R95W - lek active in 2003.

Sage grouse populations throughout Wyoming remain well below both historic and WGFD desired levels due to low recruitment resulting from poor nesting conditions attributable to the ongoing drought as well as other poorly understood factors such as predation and habitat loss. Declining populations of sage grouse in Grouse Management Area 9 have resulted in action designed to reduce harvest including shortening the hunting season from 30 days in 1993 to 9 days in 2002 and a concomitant reduction in bag limits from 3 birds per day with 9 in possession in 1993 to 2 birds per day with 4 birds in possession in 2002. These population declines are clearly defined in extant harvest data which recorded a harvest of 6,876 birds by 2,441 hunters in 1993 versus 1,728 birds harvested by 788 hunters in 2002 (WGFD 2003b). There are no population data estimates for sage grouse within the SLPA.

3.10.3 Raptor Species

Several birds-of-prey species may occur within the SLPA including ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), golden eagle (*Aquila cyrysaetos*), and prairie falcon (*Falco mexicanus*). Table 3.6 provides information on the five (5) ferruginous hawk nests which have been documented in or adjacent to the SLPA.

Table 3.6

Raptor Nesting Activity In or Adjacent to the SLPA

Raptor Species	Nest Type	2003 Nest Condition	Legal Location of Nest Structure				2004 Status
			Quarter-Quarter	Section	Township	Range	
FH	Stick	Fair	SE¼SE¼	15	26 North	97 West	Inactive
FH	Stick	Poor	Center NE¼	22	26 North	97 West	Inactive
FH	Stick	Good	SE¼NE¼	23	26 North	97 West	Inactive
FH	Stick	Good	SE¼NW¼	25	26 North	97 West	Inactive
FH	Stick	Good	SE¼SE¼	26	26 North	97 West	Inactive

3.10.4 Threatened and Endangered Species

Threatened and/or endangered (T/E) species include those species which are in danger of extinction due to drastic population declines and which have subsequently been listed as threatened or endangered pursuant to the *Endangered Species Act* (ESA) of 1973 (as amended). Those T/E species identified by the U.S. Fish and Wildlife Service (USFWS) which may potentially occur within the project area include:

✱ **Bald eagle** (*Haliaeetus leucocephalus*) - Status: Threatened.

Migrant through the area during the fall and spring migrational periods, seasonal resident during the winter months along major river systems throughout the state.

Historic habitat for bald eagles migrating through or wintering in west central Wyoming would include riparian area(s) along the North Platte River in Carbon and Natrona Counties; the Big and Little Wind Rivers in Fremont County; the Green River in Lincoln, Sweetwater and Sublette Counties; and the Little Snake River in Carbon County which provide roosting and perching areas for eagles foraging along the river courses and their adjacent uplands. There are no known bald eagle roosting areas in northeastern Sweetwater or southern Fremont County (south of the Shoshone National Forest boundary)(BLM 2004a).

Open rangelands throughout west-central Wyoming are probably being used opportunistically by bald eagles for foraging; however, no bald eagles have been observed in the area in conjunction with BLM or BLM-approved inventories within the project area (BLM 2004a).

∉ **Black-footed ferret** (*Mustela nigripes*) - Status: Endangered.

Potential resident in prairie dog (*Cynomys sp.*) colonies.

As there are no known prairie dog towns within the SLPA, impacts to black-footed ferrets are not expected to occur.

∉ **Ute ladies'-tresses** (*Spiranthes diluvialis*) - Status: Threatened.

Potential resident in seasonally moist soils and wet meadows below 7,000 feet. Locally found in the North Platte River drainage below Alcova Reservoir and in the drainages of the Cheyenne and Niobrara Rivers in southeastern Wyoming.

As indicated above, there are no perennial or intermittent streams with associated riparian habitats within the SLPA. Furthermore, as the SLPA does not occur in the drainages of the North Platte, Cheyenne, or Niobrara Rivers, the expected area(s) of occurrence, impacts to Ute ladies'-tresses are not expected to occur.

∉ **Water Depletions to the North Platte and Colorado River Systems**

In their response to project scoping, the U.S. Fish and Wildlife Service also identified four T/E fish species which could potentially be affected by water depletions to the Colorado River system (including the Colorado, Green and Yampa rivers) including the endangered bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*). In this regard, the Great Divide Basin is a hydrographically closed basin from both a surface and subsurface standpoint (BLM 2003a). The proposed SLPP has no potential to affect or impact the Colorado River System or the T/E species residing therein; consequently, these species will not be given further consideration in this document.

Although not specifically identified by the USFWS in their response to project scoping, water depletions to the North Platte River system could also potentially affect five T/E species including the endangered interior least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirhynchus albus*), and Eskimo curlew (*Numenius borealis*) as well as the threatened piping plover

(*Charadrius melodus*) and western prairie fringed orchid (*Platanthera praeclara*). Considering that no North Platte River depletions would result from the proposed action, the SLPP has no potential to affect or impact the North Platte River System or the T/E species residing therein; consequently, these species will not be given further consideration in this document.

3.10.5 Special Status Species

Special status species would include those plants/animals that do not currently warrant protection under the *Endangered Species Act* of 1973 (as amended), yet are considered by the Bureau of Land Management as sensitive species. Special status species that may be expected to occur within the SLPA include:

∉ **Mountain plover** (*Charadrius montanus*)

The mountain plover is generally considered an associate of the shortgrass prairie, which is dominated by blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*) (Graul 1975). The species breeds across the western Great Plains and at isolated locales in western Colorado, Wyoming and New Mexico (Leachman and Osmundson 1990). Between 1966 and 1991, continental populations of the mountain plover declined by 63% (Knopf 1994), with the Pawnee National Grassland in Weld County, Colorado being both the historic and current breeding stronghold of this aridland member of the family Charadriidae (Graul and Webster 1976). A second major breeding population of mountain plovers is currently located on the Charles M. Russell National Wildlife Refuge in Phillips, Montana (Knopf and Miller 1994).

In April of 2004 a search was made of the Wyoming Natural Diversity Database (WYNDDDB) records to determine if any sightings of mountain plover had been recorded within Township 26 North, Ranges 96 and 97 West. One mountain plover sighting was recorded in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 17 in Township 26 North, Range 97 West on May 2, 1993. No additional sightings are documented in the WYNDDDB (WYNDDDB 2004).

3.10.6 Migratory and Non-Migratory Birds

Habitats in the SLPA and immediate vicinity are primarily sagebrush-dominated uplands (shrub-steppe) with interspersed shortgrass prairie (WYNDDDB 2004). Wyoming Partners in Flight (PIF) priority species potentially occurring in the shrub-steppe (SS) and shortgrass prairie (SGP) habitat types are listed in Table 3.8 (Nicholoff 2003).

In this regard, the SLPA lies within an area directly north of latitude 42°11'25" N and directly west of longitude 108°17'50" W. Species distribution as reported in *The Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming* (WGFD 1999) includes a compilation of observations mapped by latitude and longitude, with the State of Wyoming divided into 28 different regions, where these observations are reported within a specific region of the state. These regions are based upon a one degree separation of both latitude and longitude. As a consequence, the SLPA falls with Wyoming Distribution Area (latilongs) 17 as defined by WGFD (1999). Avian distribution data contained in *The Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming* (WGFD 1999) for the PIF priority species potentially occurring within

the SLPA is included in Table 3.7. Only those birds that have been classified by WGFD (1999) as confirmed breeders (nest and/or young observed), with circumstantial evidence of breeding (nest and/or young not located), or that have been observed at any time (season) within the general area (but without any evidence of breeding) are included in the list. Breeding Bird Survey (BBS) data for survey routes within Wyoming were included in this database (WGFD 1999). Definitions for those symbols used in Table 3.7 to report Wyoming distribution are as follows:

- ∅ B: Nest or young dependent upon parent birds observed.
- ∅ b: Circumstantial evidence of breeding.
- ∅ O: The species has been observed, but there was no evidence of nesting.
- ∅ N: The species has not been observed in the area.

Most of the birds listed in Table 3.7 typically nest either on the ground or in shrubs; thus activities associated with the Proposed Action may have the potential to destroy individual nests, eggs, and/or young of some of these species. Projected losses are indeterminate as there are no Breeding Bird Survey (BBS) routes located within the immediate vicinity of the SLPA which could provide information on breeding bird densities within the shrub-steppe and shortgrass prairie habitats encountered within the SLPA.

Concerns regarding the decline of both migratory and non-migratory bird populations both locally and on a continental scale have resulted in a nationwide bird conservation planning effort. Management goals and objectives for bird conservation are found in the following documents:

- 1) Land Bird Strategic Plan;
- 2) Presidential Executive Order (EO) 13186 dated January 17, 2001; and
- 3) Proposed Memorandum of Understanding associated with the above Presidential EO.

Bird Conservation Plans prepared at the state and regional levels also include objectives for bird conservation. As evidenced by EO 13186, there has been national direction to implement actions that incorporate these goals.

3.11 WILD HORSE MANAGEMENT

The proposed SLPA falls in the extreme southwest corner of the Antelope Hills Horse Management Area (HMA) which is administered by BLM's Lander Field Office (LFO). This HMA encompasses approximately 110,000 acres of both federal and non-federal lands in Fremont and Sweetwater Counties.

Table 3.7

**List of Partners In Flight (PIF) Priority Bird Species
Potentially Found Within the SLPA**

Common Name	Scientific Name	Habitat Type	Distribution
			Area 17
Level I Species (Conservation Action)			
Ferruginous Hawk	<i>Buteo regalis</i>	SS/SGP	B
Mountain Plover	<i>Charadrius montanus</i>	SS/SGP	B
Upland Sandpiper	<i>Bartramia longicauda</i>	SGP	N
Long-billed Curlew	<i>Numenius Americana</i>	SGP/M	B
Burrowing Owl	<i>Athene cunicularia</i>	SGP	B
Short-eared Owl	<i>Asio flammeus</i>	SGP/M	O
Brewer’s Sparrow	<i>Spizella breweri</i>	SS/MFS	B
Sage Sparrow	<i>Amphispiza belli</i>	SS/MFS	b
McCown’s Longspur	<i>Calcarius mccownii</i>	SS/SGP	O
Level II Species (Monitoring)			
Loggerhead Shrike	<i>Lanius ludovicianus</i>	SS	b
Sage Thrasher	<i>Oreoscoptes montanus</i>	SS	B
Vesper Sparrow	<i>Pooecetes gramineus</i>	SS	B
Lark Sparrow	<i>Chondestes grammacus</i>	SS	B
Lark Bunting	<i>Calamospiza melanocorys</i>	SGP	O
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	SGP	N
Chestnut-collared Longspur	<i>Calcarius omatus</i>	SGP	N
Dickcissel	<i>Spiza Americana</i>	SGP	O
Bobolink	<i>Dolichonyx oryzivorus</i>	SGP/M	B
Level III Species (Local Interest)			
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	SS/MFS	b
Say’s Phoebe	<i>Sayornis saya</i>	SS	O

Source: Wyoming Bird Conservation Plan, Version 2.0 (Nicholoff 2003)

The population objective or “appropriate management level” (AML) for this particular HMA is 60 to 82 adult horses with a population currently estimated at 166 horses. Two other HMAs occur directly adjacent to the SLPA as follows:

∅ Lost Creek HMA which is managed by BLMs Rawlins Field Office (RFO); and

∉ Great Divide Basin HMA which is managed by BLMs Rock Springs Field Office.

The Lost Creek HMA encompasses approximately 250,000 acres, lies completely within the Great Divide Basin, and adjoins the Antelope Hills HMA directly to the south of the SLPA. The AML for the Lost Creek HMA is 140 to 165 adult horses, with the population currently estimated at 143 horses. Through genetic testing, the Lost Creek wild horse herd has been shown to carry a very high percentage of genetic markers identified with the Spanish Mustang breed, which means that these horses are genetically more like the Spanish Mustang and other New World Iberian breeds than other breeds such as American Quarter Horse or Morgan. The Spanish Mustang breed was introduced to the Americas by the Spanish explorers and conquistadors in the 1500s. As a consequence, this characteristic makes these horses unique among the wild horse herds tested in Wyoming to date.

The Great Divide Basin HMA encompasses approximately 778,915 acres and adjoins the Antelope Hills HMA approximately 8 miles to the west of the SLPA boundary. The AML for the Great Divide Basin HMA is 415 to 600 adult horses, with the population currently estimated at 812 horses.

Horses in the Antelope Hills and Great Divide Basin HMAs have not been genetically tested to determine if they share genetic markers with the Spanish Mustang breed; however, horses in all three herds are considered as one single meta-population that has been subdivided into separate herds for management purposes.